Morphology of Various Strains of the Trypanosome causing Disease in Man in Nyasaland: The Human Strain (continued).—VI *to* X.

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INTRODUCTION.

In a former paper* five strains of this species of trypanosome, obtained from man, were described. In this it is intended to describe another set of five. A small quantity of blood was taken from the sick native, brought up to the laboratory, and inoculated into a monkey or white rat.

Strains VII, VIII, and X were directly inoculated into the rat from which the drawings and measurements were made; in Strains VI and IX a single monkey intervened. These five strains have therefore been obtained under fairly similar circumstances, and should prove useful for purposes of comparison. This is put in tabular form in Table I, and the history of the previous five strains is also given, as this was omitted in the former paper. It is possible that the type of a strain may be changed by passage through different animals before it reaches the rat.

Table I.—Showing the Passages through Animals between Man and the Rat whose Trypanosomes are Drawn and Measured.

Strain.	Man.	Monkey.	Dog.	Rat.
I, Mkanyanga	—	—	—	—
II, E——...............	1	—	2	3
III, Chituluka	1	—	2	3
IV, Chipochola	1	—	2	3
V, Chibibi	1	—	2	3
VI, Manakumpara ...	1	2	—	3
VII, Yoramu	1	—	—	2
VIII, Mekka	1	—	—	2
IX, Mkanthama	1	2	—	3
X, Dongolosi	1	—	—	2

From this table it will be seen that little time was lost in inoculating the rat, the trypanosomes in whose blood were drawn and measured.

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* 'Roy. Soc. Proc.,' B, vol. 86, p. 285 (1913).

On comparing the curves from the 10 strains it cannot be said that the passage from dog to rat, or from monkey to rat, or direct from man to rat, has had any marked influence on the character of the curve. But in these cases only a single monkey or dog intervened.

In the case of Strain I, Mkanyanga, the trypanosomes were taken at random from several species of animals;* 600 trypanosomes from four different rats were measured. The passages are as follows:—(1) Man, monkey, Rat 38; (2) man, dog, rat, rat, Rat 37; (3) man, monkey, guinea-pig, monkey, Rat 236; (4) man, monkey, guinea-pig, monkey, Rat 235.

VI. MORPHOLOGY OF STRAIN VI, MANAKUMPARA.

The following Table gives the average length of this trypanosome as found in the white rat, 500 trypanosomes in all, and also the longest and shortest:—

Table II.—Measurements of the Length of the Trypanosome of Strain VI, Manakumpara.

Date.	Expt. No.	Animal.	Method of fixing.	Method of staining.	In microns.		
					Average length.	Maximum length.	Minimum length.
1913.							
June 30 ...	2239	Rat	Osmic acid	Giemsa	21·4	27·0	18·0
,, 30 ...	2239	,, ...	,,	,,	21·6	29·0	18·0
,, 30 ...	2239	,, ...	,,	,,	22·1	27·0	20·0
July 1 ...	2239	,, ...	,,	,,	19·0	23·0	17·0
,, 1 ...	2239	,, ...	,,	,,	18·6	23·0	15·0
,, 1 ...	2239	,, ...	,,	,,	18·6	23·0	16·0
,, 2 ...	2239	,, ...	,,	,,	19·8	22·0	17·0
,, 2 ...	2239	,, ...	,,	,,	20·6	25·0	17·0
,, 2 ...	2239	,, ...	,,	,,	19·3	21·0	17·0
,, 3 ...	2239	,, ...	,,	,,	21·1	27·0	17·0
,, 3 ...	2239	,, ...	,,	,,	21·8	26·0	17·0
,, 3 ...	2239	,, ...	,,	,,	22·6	30·0	17·0
,, 4 ...	2239	,, ...	,,	,,	23·0	26·0	17·0
,, 4 ...	2239	,, ...	,,	,,	23·0	29·0	18·0
,, 4 ...	2239	,, ...	,,	,,	23·0	28·0	19·0
,, 5 ...	2239	,, ...	,,	,,	22·4	28·0	17·0
,, 5 ...	2239	,, ...	,,	,,	21·8	30·0	17·0
,, 5 ...	2239	,, ...	,,	,,	23·8	29·0	18·0
,, 7 ...	2239	,, ...	,,	,,	23·5	28·0	21·0
,, 7 ...	2239	,, ...	,,	,,	22·9	30·0	17·0
,, 7 ...	2239	,, ...	,,	,,	24·5	32·0	19·0
,, 8 ...	2239	,, ...	,,	,,	23·0	28·0	19·0
,, 8 ...	2239	,, ...	,,	,,	22·6	29·0	17·0
,, 8 ...	2239	,, ...	,,	,,	21·2	27·0	15·0
,, 9 ...	2239	,, ...	,,	,,	20·6	26·0	15·0
					21·7	32·0	15·0

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* 'Roy. Soc. Proc.,' B, vol. 85, p. 427 (1912).

Table III.—Distribution in respect to Length of 500 Individuals of the Trypanosome of Strain VI, Manakumpara, from Rat 2239.

	In microns.																	
	15.	16.	17.	18.	19.	20.	21.	22.	23.	24.	25.	26.	27.	28.	29.	30.	31.	32.
Totals	3	5	22	40	46	74	82	62	40	37	23	16	23	18	5	3	—	1
Percentages ...	0·6	1·0	4·4	8·0	9·2	14·8	16·4	12·4	8·0	7·4	4·6	3·2	4·6	3·6	1·0	0·6	—	0·2

Chart 1.—Curve representing the Distribution, by Percentages, in respect to Length, of 500 Individuals of the Trypanosome of Strain VI, Manakumpara, taken on nine consecutive days from Rat 2239.

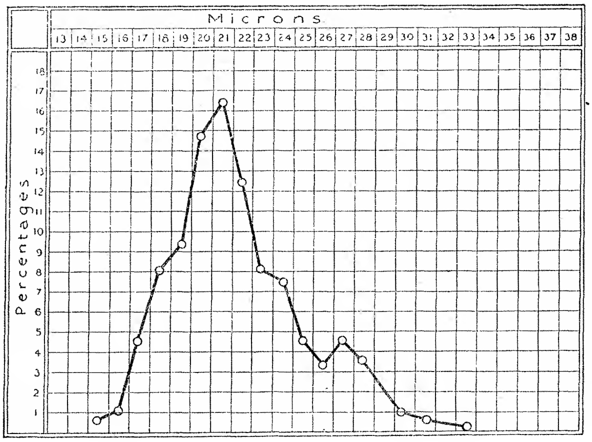


Table IV.—Percentage of Posterior-nuclear Forms found among the Short and Stumpy Varieties of the Trypanosome of Strain VI, Manakumpara.

Date.	Experiment No.	Animal.	Percentage among short and stumpy forms.
1913.			
June 30	2239	Rat	4
July 1	2239	,, ...	16
,, 2	2239	,, ...	16
,, 3	2239	,, ...	14
,, 4	2239	,, ...	9
,, 5	2239	,, ...	21
,, 7	2239	,, ...	8
,, 8	2239	,, ...	13
,, 9	2239	,, ...	17
,, 10	2239	,, ...	25
		Average	14·3

Breadth.—The following Table gives the breadth of the trypanosome of Strain VI, Manakumpara:—

Table V.—Measurements of the Breadth of the Trypanosome of Strain VI, Manakumpara.

Date.	Experiment No.	Animal.	Number of trypanosomes measured.	In microns.		
				Average breadth.	Maximum breadth.	Minimum breadth.
1913	2239	Rat	500	2·76	4·50	1·25

In regard to shape, contents of cell, size and position of nucleus and micronucleus, disposal of undulating membrane and flagellum, no difference can be made out between the Strains VI to X and the first five strains.

VII. MORPHOLOGY OF STRAIN VII, YORAMU.

The following Table gives the average length of this trypanosome as found in the white rat, 500 trypanosomes in all, and also the longest and shortest:—

Table VI.—Measurements of the Length of the Trypanosome of Strain VII, Yoramu.

Date.	Expt. No.	Animal.	Method of fixing.	Method of staining.	In microns.		
					Average length.	Maximum length.	Minimum length.
1913.							
June 30 ...	2236	Rat	Osmic acid	Giemsa	25·8	28·0	23·0
" 30 ...	2236	"	"	"	26·7	33·0	21·0
" 30 ...	2236	"	"	"	26·9	31·0	22·0
July 1 ...	2236	"	"	"	27·0	32·0	18·0
" 1 ...	2236	"	"	"	26·8	32·0	21·0
" 1 ...	2236	"	"	"	25·8	31·0	21·0
" 2 ...	2236	"	"	"	20·3	24·0	18·0
" 2 ...	2236	"	"	"	21·5	26·0	18·0
" 2 ...	2236	"	"	"	21·9	29·0	19·0
" 3 ...	2236	"	"	"	20·5	28·0	16·0
" 3 ...	2236	"	"	"	20·2	29·0	16·0
" 3 ...	2236	"	"	"	19·4	26·0	16·0
" 4 ...	2236	"	"	"	19·4	23·0	17·0
" 4 ...	2236	"	"	"	19·9	24·0	18·0
" 4 ...	2236	"	"	"	19·5	22·0	18·0
" 5 ...	2236	"	"	"	22·0	27·0	18·0
" 5 ...	2236	"	"	"	21·7	30·0	17·0
" 5 ...	2236	"	"	"	21·9	30·0	18·0
" 6 ...	2236	"	"	"	21·7	28·0	17·0
" 6 ...	2236	"	"	"	21·5	28·0	17·0
" 6 ...	2236	"	"	"	22·3	28·0	18·0
" 7 ...	2236	"	"	"	22·5	28·0	18·0
" 7 ...	2236	"	"	"	22·5	28·0	18·0
" 7 ...	2236	"	"	"	22·0	29·0	18·0
" 8 ...	2236	"	"	"	22·4	34·0	18·0
					22·5	34·0	16·0

Table VII.—Distribution in respect to Length of 500 Individuals of the Trypanosome of Strain VII, Yoramu, from Rat 2236.

	In microns.																		
	16.	17.	18.	19.	20.	21.	22.	23.	24.	25.	26.	27.	28.	29.	30.	31.	32.	33.	34.
Totals	3	9	40	84	67	38	47	27	28	31	33	37	21	13	13	5	2	1	1
Percentages ...	0·6	1·8	8·0	16·8	13·4	7·6	9·4	5·4	5·6	6·2	6·6	7·4	4·2	2·6	2·6	1·0	0·4	0·2	0·2

Chart 2.—Curve representing the Distribution, by Percentages, in respect to Length, of 500 Individuals of the Trypanosome of Strain VII, Yoramu, taken on nine consecutive days from Rat 2236.

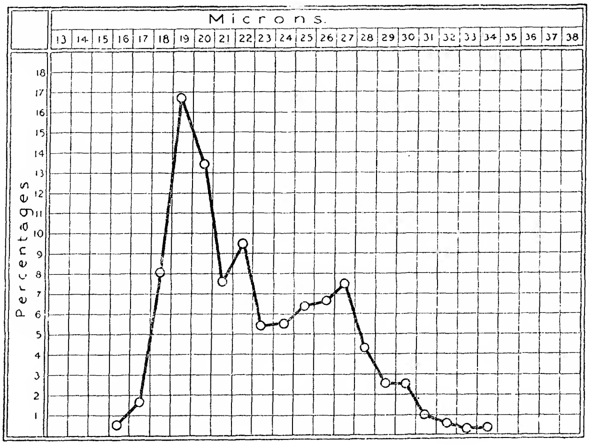


Table VIII.—Percentage of Posterior-nuclear Forms found among the Short and Stumpy Varieties of the Trypanosome of Strain VII, Yoramu.

Date.	Experiment No.	Animal.	Percentage among short and stumpy forms.
1913.			
June 30	2236	Rat	0
July 1	2236	"	1
" 2	2236	"	15
" 3	2236	"	0
" 4	2236	"	2
" 5	2236	"	0
" 7	2236	"	10
" 8	2236	"	36
" 9	2236	"	34
" 10	2236	"	36
		Average	13·4

Breadth.—The following Table gives the breadth of the trypanosome of Strain VII, Yoramu:—

Table IX.—Measurements of the Breadth of the Trypanosome of Strain VII, Yoramu.

Date.	Experiment No.	Animal.	Number of trypanosomes measured.	In microns.		
				Average breadth.	Maximum breadth.	Minimum breadth.
1913	2236	Rat ……	500	2·51	4·50	1·25

VIII. MORPHOLOGY OF STRAIN VIII, MEKKA.

The following Table gives the average length of this trypanosome as found in the white rat, 500 trypanosomes in all, and also the longest and shortest:—

Table X.—Measurements of the Length of the Trypanosome of Strain VIII, Mekka.

Date.	Expt. No.	Animal.	Method of fixing.	Method of staining.	In microns.		
					Average length.	Maximum length.	Minimum length.
1913.							
Aug. 27…	2300	Rat ………..	Osmic acid	Giemsa	21·2	26·0	19·0
" 27…	2300	" ………..	"	"	23·2	29·0	20·0
" 27…	2300	" ………..	"	"	21·1	28·0	18·0
" 28…	2300	" ………..	"	"	22·2	27·0	19·0
" 28…	2300	" ………..	"	"	22·4	26·0	18·0
" 28…	2300	" ………..	"	"	23·4	29·0	20·0
" 29…	2300	" ………..	"	"	21·4	26·0	20·0
" 29…	2300	" ………..	"	"	23·0	28·0	21·0
" 29…	2300	" ………..	"	"	21·0	24·0	18·0
" 30…	2300	" ………..	"	"	20·4	23·0	18·0
" 30…	2300	" ………..	"	"	22·1	28·0	18·0
" 30…	2300	" ………..	"	"	20·7	25·0	18·0
" 31…	2300	" ………..	"	"	20·7	24·0	18·0
" 31…	2300	" ………..	"	"	21·4	29·0	18·0
" 31…	2300	" ………..	"	"	21·1	27·0	18·0
Sept. 1…	2300	" ………..	"	"	24·8	32·0	30·0
" 1…	2300	" ………..	"	"	23·8	33·0	20·0
" 1…	2300	" ………..	"	"	24·1	28·0	19·0
" 2…	2300	" ………..	"	"	23·9	30·0	19·0
" 2…	2300	" ………..	"	"	23·6	29·0	16·0
" 2…	2300	" ………..	"	"	23·2	30·0	20·0
" 3…	2300	" ………..	"	"	24·0	32·0	20·0
" 3…	2300	" ………..	"	"	23·1	29·0	20·0
" 3…	2300	" ………..	"	"	23·5	30·0	21·0
" 4…	2300	" ………..	"	"	21·3	27·0	18·0
					22·4	33·0	16·0

Table XI.—Distribution in respect to Length of 500 Individuals of the Trypanosome of Strain VIII, Mekka, from Rat 2300.

	In microns.																	
	16.	17.	18.	19.	20.	21.	22.	23.	24.	25.	26.	27.	28.	29.	30.	31.	32.	33.
Totals	1	—	19	30	69	89	80	68	49	34	20	8	10	13	5	2	2	1
Percentages	0·2	—	3·8	6·0	13·8	17·8	16·0	13·6	9·8	6·8	4·0	1·6	2·0	2·6	1·0	0·4	0·4	0·2

CHART 3.—Curve representing the Distribution, by Percentages, in respect to Length, of 500 Individuals of the Trypanosome of Strain VIII, Mekka, taken on nine consecutive days from Rat 2300.

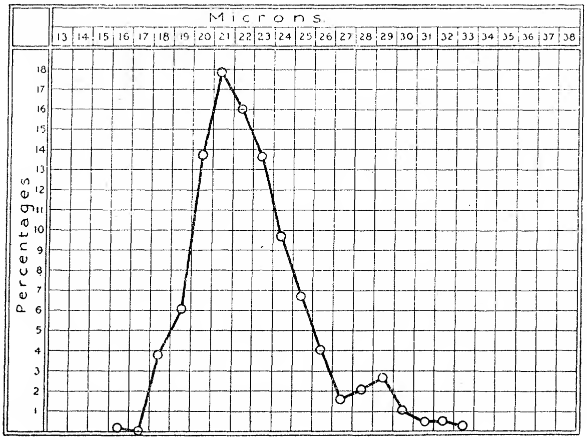


Table XII.—Percentage of Posterior-nuclear Forms found among the Short and Stumpy Varieties of the Trypanosome of Strain VIII, Mekka.

Date.	Experiment No.	Animal.	Percentage among short and stumpy forms.
1913.			
July 27	2300	Rat	5
,, 28	2300	,, ...	8
,, 29	2300	,, ...	22
Aug. 2	2300	,, ...	9
,, 3	2300	,, ...	13
,, 7	2300	,, ...	38
,, 8	2300	,, ...	40
,, 9	2300	,, ...	41
,, 11	2300	,, ...	37
,, 14	2300	,, ...	29
		Average	24·2

Breadth.—The following Table gives the breadth of the trypanosome of Strain VIII, Mekka :—

Table XIII.—Measurements of the Breadth of the Trypanosome of Strain VIII, Mekka.

Date.	Experiment No.	Animal.	Number of trypanosomes measured.	In microns.		
				Average breadth.	Maximum breadth.	Minimum breadth.
1913	2300	Rat	500	2·68	5·00	1·25

IX. MORPHOLOGY OF STRAIN IX, MKANTHAMA.

The following Table gives the average length of this trypanosome as found in the white rat, 500 trypanosomes in all, and also the longest and shortest :—

Table XIV.—Measurements of the Length of the Trypanosome of Strain IX, Mkanthama.

Date.	Expt. No.	Animal.	Method of fixing.	Method of staining.	In microns.		
					Average length.	Maximum length.	Minimum length.
1913.							
Aug. 18 ...	2386	Rat	Osmic acid	Giemsa	23·2	31·0	17·0
,, 18 ...	2386	,, ...	,,	,,	26·7	33·0	18·0
,, 18 ...	2386	,, ...	,,	,,	25·1	32·0	18·0
,, 19 ...	2386	,, ...	,,	,,	19·0	24·0	17·0
,, 19 ...	2386	,, ...	,,	,,	18·5	26·0	16·0
,, 19 ...	2386	,, ...	,,	,,	18·2	23·0	16·0
,, 20 ...	2386	,, ...	,,	,,	19·4	24·0	17·0
,, 20 ...	2386	,, ...	,,	,,	19·8	30·0	16·0
,, 20 ...	2386	,, ...	,,	,,	19·9	30·0	16·0
,, 21 ...	2386	,, ...	,,	,,	17·7	24·0	15·0
,, 21 ...	2386	,, ...	,,	,,	17·8	22·0	14·0
,, 21 ...	2386	,, ...	,,	,,	17·5	20·0	16·0
,, 22 ...	2386	,, ...	,,	,,	19·4	31·0	15·0
,, 22 ...	2386	,, ...	,,	,,	20·5	28·0	15·0
,, 22 ...	2386	,, ...	,,	,,	21·8	29·0	15·0
,, 23 ...	2386	,, ...	,,	,,	23·5	29·0	17·0
,, 23 ...	2386	,, ...	,,	,,	24·2	32·0	16·0
,, 23 ...	2386	,, ...	,,	,,	23·4	31·0	16·0
,, 24 ...	2386	,, ...	,,	,,	24·1	33·0	18·0
,, 24 ...	2386	,, ...	,,	,,	23·4	31·0	16·0
,, 24 ...	2386	,, ...	,,	,,	21·6	30·0	17·0
,, 25 ...	2386	,, ...	,,	,,	22·0	29·0	17·0
,, 25 ...	2386	,, ...	,,	,,	21·8	31·0	17·0
,, 25 ...	2386	,, ...	,,	,,	21·2	30·0	15·0
,, 26 ...	2386	,, ...	,,	,,	19·6	26·0	17·0
					21·2	33·0	14·0

Table XV.—Distribution in respect to Length of 500 Individuals of the Trypanosome of Strain IX, Mkanthama.

	In microns.																			
	14.	15.	16.	17.	18.	19.	20.	21.	22.	23.	24.	25.	26.	27.	28.	29.	30.	31.	32.	33.
Totals ...	1	9	22	64	79	70	40	23	21	29	23	24	23	16	13	15	12	9	5	2
Percentages	0·2	1·8	4·4	12·8	15·8	14·0	8·0	4·6	4·2	5·8	4·6	4·8	4·6	3·2	2·6	3·0	2·4	1·8	1·0	0·4

Chart 4.—Curve representing the Distribution, by Percentages, in respect to Length, of 500 Individuals of the Trypanosome of Strain IX, Mkanthama, taken on nine consecutive days from Rat 2386.

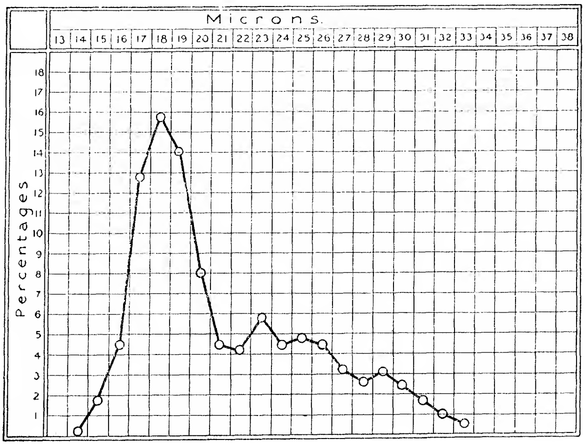


Table XVI.—Percentage of Posterior-nuclear Forms found among the Short and Stumpy Varieties of the Trypanosome of Strain IX, Mkanthama.

Date.	Experiment No.	Animal.	Percentage among short and stumpy forms.
1913.			
May 18	2386	Rat	13
„ 19	2386	„	32
„ 20	2386	„	18
„ 21	2386	„	11
„ 22	2386	„	19
„ 23	2386	„	27
„ 24	2386	„	34
„ 25	2386	„	33
„ 26	2386	„	45
„ 28	2386	„	54
		Average	28·6

Breadth.—The following Table gives the breadth of the trypanosome of Strain IX, Mkanthama.

Table XVII.—Measurements of the Breadth of the Trypanosome of Strain IX, Mkanthama.

Date.	Experiment No.	Animal.	Number of trypanosomes measured.	In microns.		
				Average breadth.	Maximum breadth	Minimum breadth.
1913	2386	Rat	500	2·56	5·00	1·25

X. MORPHOLOGY OF STRAIN X, DONGOLOSI.

The following Table gives the average length of this trypanosome, as found in the white rat, 500 trypanosomes in all, and also the longest and shortest:—

Table XVIII.—Measurements of the Length of the Trypanosome of Strain X, Dongolosi.

Date.	Expt. No.	Animal.	Method of fixing.	Method of staining.	In microns.		
					Average length.	Maximum length.	Minimum length.
1913.							
Nov. 27 ...	2437	Rat	Osmic acid	Giemsa	24·8	30·0	20·0
„ 27 ...	2437	„	„	„	24·6	29·0	21·0
„ 27 ...	2437	„	„	„	25·0	29·0	21·0
„ 28 ...	2437	„	„	„	19·9	22·0	17·0
„ 28 ...	2437	„	„	„	19·9	23·0	18·0
„ 28 ...	2437	„	„	„	19·6	22·0	18·0
Dec. 2 ...	2437	„	„	„	23·2	28·0	17·0
„ 2 ...	2437	„	„	„	22·0	29·0	18·0
„ 2 ...	2437	„	„	„	23·2	28·0	18·0
„ 3 ...	2437	„	„	„	24·0	30·0	20·0
„ 3 ...	2437	„	„	„	23·7	29·0	20·0
„ 3 ...	2437	„	„	„	24·0	30·0	19·0
„ 4 ...	2437	„	„	„	23·2	27·0	19·0
„ 4 ...	2437	„	„	„	23·2	30·0	19·0
„ 4 ...	2437	„	„	„	23·7	26·0	21·0
„ 5 ...	2437	„	„	„	24·3	28·0	20·0
„ 5 ...	2437	„	„	„	23·9	29·0	19·0
„ 5 ...	2437	„	„	„	24·4	28·0	21·0
„ 6 ...	2437	„	„	„	24·9	30·0	20·0
„ 6 ...	2437	„	„	„	25·2	30·0	22·0
„ 6 ...	2437	„	„	„	24·5	28·0	21·0
„ 7 ...	2437	„	„	„	25·3	31·0	20·0
„ 7 ...	2437	„	„	„	25·0	30·0	20·0
„ 7 ...	2437	„	„	„	24·8	32·0	20·0
„ 8 ...	2437	„	„	„	22·3	25·0	18·0
					23·5	32·0	17·0

Table XIX.—Distribution in respect to Length of 500 Individuals of the Trypanosome of Strain X, Dongolosi.

	In microns.															
	17.	18.	19.	20.	21.	22.	23.	24.	25.	26.	27.	28.	29.	30.	31.	32.
Totals	2	9	30	36	51	52	69	68	61	48	25	23	11	12	2	1
Percentages ...	0·4	1·8	6·0	7·2	10·2	10·4	13·8	13·6	12·2	9·6	5·0	4·6	2·2	2·4	0·4	0·2

Chart 5.—Curve representing the Distribution, by Percentages, in respect to Length, of 500 Individuals of the Trypanosome of Strain X, Dongolosi, taken on nine consecutive days from Rat 2437, at the beginning of the infection.

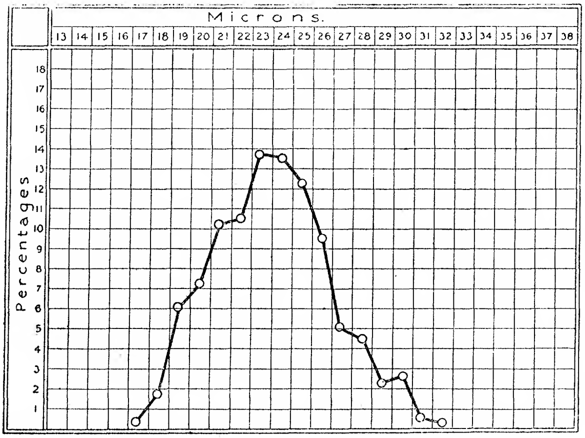
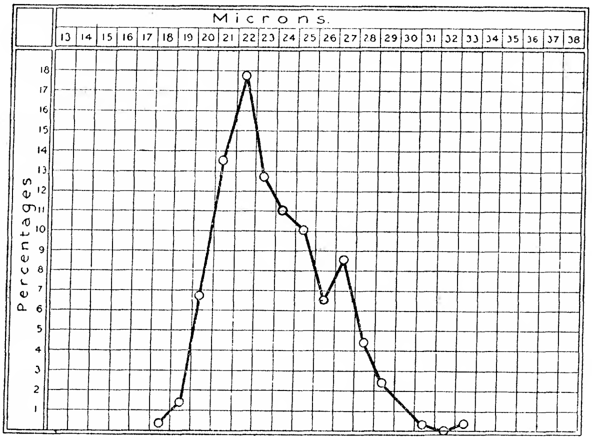


Chart 6.—Curve representing the Distribution, by Percentages, in respect to Length, of 500 Individuals of the Trypanosome of Strain X, Dongolosi, taken on the 33rd to 41st day of disease from Rat 2462.



It is evident that in this case there is little difference in type in the trypanosomes taken during the first nine days and the last nine days of an infection. In the former there are 25 per cent. short and stumpy forms, 37 per cent. intermediate, and 38 per cent. long and slender; in the latter 22, 43, and 35 per cent. respectively.

Table XX.—Percentage of Posterior-nuclear Forms found among the Short and Stumpy Varieties of the Trypanosome of Strain X, Dongolosi.

Date.	Experiment No.	Animal.	Percentage among short and stumpy forms.
1913.			
Nov. 27	2437	Rat	1
„ 28	2437	„	3
Dec. 2	2437	„	0
„ 3	2437	„	1
„ 4	2437	„	10
„ 5	2437	„	3
„ 6	2437	„	4
„ 7	2437	„	7
„ 8	2437	„	10
„ 9	2437	„	11
		Average	5·0

Breadth.—The following Table gives the breadth of the trypanosome of Strain X, Dongolosi.

Table XXI.—Measurements of the Breadth of the Trypanosome of Strain X, Dongolosi.

Date.	Experiment No.	Animal.	Number of trypanosomes measured.	In microns.		
				Average breadth.	Maximum breadth.	Minimum breadth.
1913	2437	Rat	500	2·71	4·50	1·25

TO ASCERTAIN THE TYPE OF TRYPANOSOME WHICH ARISES FROM A SINGLE TRYPANOSOME.

There is always, when dealing with a dimorphic type of trypanosome, a danger of there being two species present. Some experiments were, therefore, made by inoculating animals with a single trypanosome, to find out if the original dimorphic type would appear. The single trypanosomes were picked out in the usual way, by means of dilution and capillary tubes. The blood of an infected rat was diluted with normal saline solution until a volume one-sixteenth of an inch in length of a fine capillary tube was found to contain a single trypanosome. This was then inoculated into a rat. Six experiments were made, three of which were successful. In each case the long and slender type of trypanosome was isolated and injected.

As will be seen from the following curves, from the single long and slender type, short and stumpy, intermediate, and long and slender forms resulted. Among the short and stumpy there was a large percentage of the blunt-ended posterior-nucleated forms, which are a feature of this species of trypanosome.

From these three experiments, then, it may be concluded that in the dimorphic trypanosome causing disease in man in Nyasaland, a single species is being dealt with.

Chart 7.—Curve representing the Distribution, by Percentages, in respect to Length, of 500 Individuals of the Trypanosome of Strain X, Dongolosi, taken on nine consecutive days from Rat 2493, which had been infected by a single trypanosome of the long and slender type.

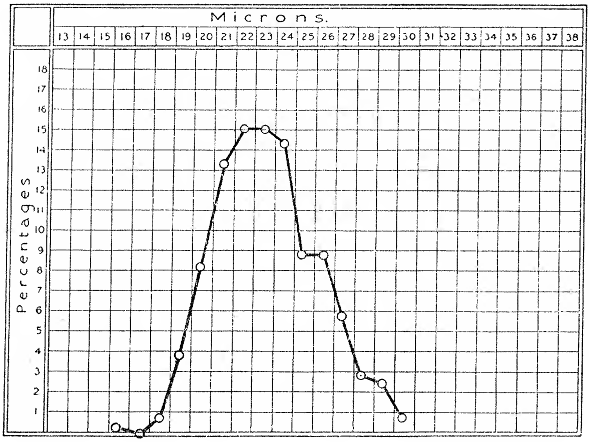
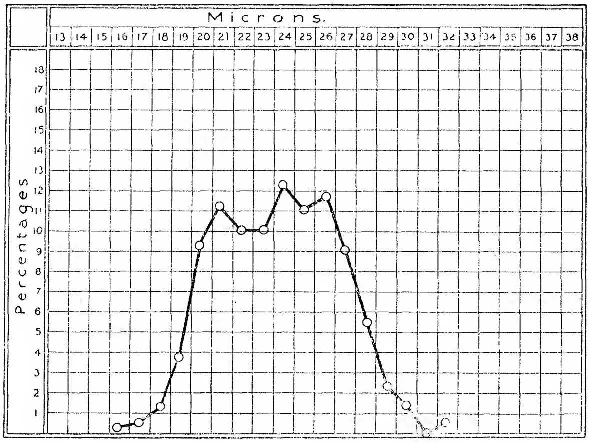


CHART 8.—Curve representing the Distribution, by Percentages, in respect to Length, of 500 Individuals of the Trypanosome of Strain X, Dongolosi, taken on nine consecutive days from Rat 2489, which had been infected by a single trypanosome of the long and slender type.



COMPARISON OF THE HUMAN STRAINS VI TO X.

Table XXII.—Measurements of the Length of the Trypanosomes of the Five Human Strains VI to X. The trypanosomes have been taken from the rat alone.

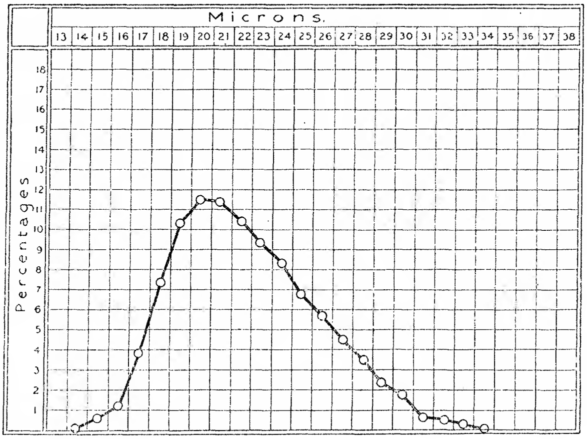
Date.	Strain.	Name.	Number of trypanosomes measured.	In microns.		
				Average length.	Maximum length.	Minimum length.
1913	VI	Manakumpara	500	21·7	32·0	15·0
1913	VII	Yoramu.........	500	22·5	34·0	16·0
1913	VIII	Mekka	500	22·4	33·0	16·0
1913	IX	Mkanthama ...	500	21·2	33·0	14·0
	X	Dongolosi	500	23·5	32·0	17·0
				22·3	34·0	14·0

The average length of Strains I to V, taken from rats alone, is 24·2 microns; maximum 38, minimum 15. This gives an average for the 10 strains of 23·2 microns; maximum 38, minimum 14.

Table XXIII.—Distribution in respect to Length of 2500 Individuals of the Human Strains VI to X. The trypanosomes have been taken from the rat alone.

	In microns.																				
	14.	15.	16.	17.	18.	19.	20.	21.	22.	23.	24.	25.	26.	27.	28.	29.	30.	31.	32.	33.	34.
Totals …	1	12	31	97	187	260	286	283	262	233	205	173	140	109	85	57	45	18	11	4	1
Percentages	0·05	0·5	1·2	3·9	7·4	10·4	11·4	11·3	10·4	9·3	8·2	6·9	5·8	4·4	3·4	2·3	1·8	0·7	0·4	0·2	0·05

Chart 9.—Curve representing the Distribution, by Percentages, in respect to Length, of 2500 Individuals of the Human Strains VI to X of the Trypanosome causing Disease in Man in Nyasaland, taken from the Rat alone.



This curve is very similar to that made from Strains I to V,* except that it lies a little to the shorter side.

Table XXIV.—Comparison of the Percentages of Posterior-nuclear Forms found among the Short and Stumpy Varieties of the Human Strains VI to X.

Date.	Experiment No.	Strain.	Animal.	Percentage among short and stumpy forms.
1913	2239	VI, Manakumpara ……	Rat ………	14·3
1913	2236	VII, Yoramu ……………	,, ………	13·4
1913	2300	VIII, Mekka ……………	,, ………	24·2
1913	2386	IX, Mkanthama ………	,, ………	28·6
1913	2437	X, Dongolosi …………	,, ………	5·0
			Average …………	17·1

The average percentage of the Strains I to V was 17·8 microns.

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* 'Roy. Soc. Proc.,' B, vol. 86, p. 301 (1913).

Table XXV.—Comparison of the Measurements of the Breadth of the Trypanosomes of the Human Strains VI to X.

Date.	Experiment No.	Strain.	Animal.	In microns. Average breadth.	Maximum breadth.	Minimum breadth.
1913	2239	VI, Manakumpara ...	Rat	2·76	4·50	1·25
1913	2236	VII, Yoramu...........	,, ...	2·51	4·50	1·25
1913	2300	VIII, Mekka	,, ...	2·68	5·00	1·25
1913	2386	IX, Mkanthama	,, ...	2·56	5·00	1·25
1913	2437	X, Dongolosi	,, ...	2·71	4·50	1·25
				2·65	5·00	1·25

CONCLUSION.

These further five strains of this trypanosome, isolated from five natives in Nyasaland, belong to the same species, *Trypanosoma brucei vel rhodesiense*, the trypanosome causing disease in man in Nyasaland.

The Trypanosome causing Disease in Man in Nyasaland. II. *The Wild-game Strain.* III. *The Wild* Glossina morsitans *Strain.* Part II.—*Susceptibility of Animals.*

By Surgeon-General Sir DAVID BRUCE, C.B., F.R.S., A.M.S.; Major A. E. HAMERTON, D.S.O., and Captain D. P. WATSON, R.A.M.C.; and Lady BRUCE, R.R.C. (Scientific Commission of the Royal Society, Nyasaland, 1912–14.)

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INTRODUCTION.

In previous papers* the morphology of these strains of trypanosomes was described, and it was concluded that they are identical with the trypanosome causing disease in man in Nyasaland, the *Trypanosoma rhodesiense* of Stephens and Fantham, the *T. brucei* of this Commission.

This paper tabulates the action on animals of the two strains, and they are compared in this respect with each other and with the Human strain.

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* 'Roy. Soc. Proc.,' B, vol. 86, pp. 394 and 408.